

# EARLY STAGES OF CALIFORNIA PLUME MOTHS

—No. 1

(LEPIDOPTERA—PTEROPHORIDAE)

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This paper is intended as the first of a series dealing with the early stages of California plume moths, being especially concerned with those of the central California coastal region.

The author would like to express his appreciation to Mr. T. Bainbrigg Fletcher of England, and Mr. August Busck of the United States Bureau of Entomology and Plant Quarantine for determinations of several of these species. The host plants have been determined by Dr. H. L. Mason, Department of Botany, University of California. For the photographs illustrating the stages acknowledgment is made to Mr. W. C. Matthews, photographer for the University of California. Thanks are due Professor E. O. Essig of the University of California, under whose guidance the present study has been made.

*OIDAEMATOPHORUS GRANDIS* (Fish).<sup>1</sup> (*Pterophorus baccharides* Grinnell<sup>2</sup>). The mature larva, pupa, and larval habits of this very interesting wood-boring plume moth have been described by F. X. Williams<sup>3</sup> in 1909. Undoubtedly our knowledge concerning the distribution of this species will be increased with further search as the known range includes coastal California, Florida, Mexico, and Guatemala.

On June 24, 1937, adults emerged from infested stems of *Baccharis pilularis* collected at Half Moon Bay, California. On June 25 a pair were placed in a battery jar with a shoot of *Baccharis* and a dish of sucrose solution. Matings occurred on the night of June 28, 29 and 30, with a total of 138 eggs being laid on the under surface of the leaves and on the glass sides of the jar.

Egg: Elongate—oval; glossy. Average length 0.518 mm., average width 0.310 mm. Color, pale yellowish. Laid on horizontal or vertical axis to leaf.

The incubation period of the egg was 21 days under outside temperatures.

<sup>1</sup> Can. Ent., vol. 13, p. 141, 1881 (orig. desc.).

<sup>2</sup> Can. Ent., vol. 40, p. 317-318, 1908 (orig. desc.).

<sup>3</sup> Ent. News, vol. 20, p. 60-62, 1909.

First instar larva: Length 1.10 mm. Color, yellowish. Body robust, slightly narrowed posteriorly. Head large, dark brown in color; a W-mark on cervical shield. Anal plate dark, armed with long setae. Spiracles brown-ringed. True legs and pro-legs concolorous with body. Duration of instar 15 days.

Second instar larva: Length 2.2 mm. Color, background whitish with reddish-brown markings; a partial lighter dorsal longitudinal line with indefinite brownish markings; a lateral, oblique, brownish-red dash on each abdominal segment. Head large; color brown; glossy; ocelli ring darker. Cervical shield reddish-brown. Anal plate with two chitinized outwardly projecting processes, as in mature larva. Spiracles brown-ringed. Setigerous tubercles inconspicuous. Setae light-colored, long. All legs concolorous with body.

The larval instars between the second instar and the mature larva were not recorded.

Mature larva: Length 20 mm. Color creamy-white with reddish-brown or purplish markings; a dorsal purplish longitudinal line; an oblique sub-dorsal purplish dash on each abdominal segment; a purplish dash cephalad of each spiracle. Body slightly depressed, more robust anteriorly, slightly tapering posteriorly. Head brown; mandibles darker, with four blunt teeth; clypeus reduced; ocelli ring of 6 raised ommatidia. Cervical shield brown, with slight granulations. Abdominal segment 8, above, with granulations. Abdominal segments 9-10 transformed above into a chitinous plate projecting obliquely posteriorly, with two forcep-like processes arising from a slightly raised disc; plate coarsely granulate and periphery with long hairs. Spiracles brown-ringed. Setigerous tubercles inconspicuous. Legs concolorous with body. Crochets in a uniordinal semi-circle.



A



B

PLATE 4

- A. Mature larva of *Oidaematophorus grandis*, enlarged approximately x 4.
- B. Pupa of *Oidaematophorus grandis*, enlarged approximately x 4.

Pupa: Length 14-18 mm., greatest width 3 mm. Slender, cylindrical, slightly narrower toward center. Wing cases and appendages a light yellowish-brown; rest of body cream-colored with reddish markings on dorsal part of abdominal segments. Cephalic end obliquely truncate with long hairs and spine-like processes; dorsally a row of forwardly projecting hairs and a few scattered hairs below; a transverse row of spine-like processes ventrad and anterior of the dorsal row of hairs; developed spines at base of the antennae and base of wing cases; rest of cephalic end roughened and with small spines and hairs. Antennae reaching two-thirds of distance to end of appendages. Leg appendages projecting free to center of sixth abdominal segment. Spiracles slightly raised; brown in color. Abdominal segments with setae; on segments 4-9, a transverse row of spines which on segments 4, 5 and 6 are directly cephalad and on 7, 8, and 9 caudad; a group of sub-stigmatal spines on segments 4-9, being more developed on the posterior segments. Cremasteric end blunt and set with a semi-circle of spines.

The writer's observations concerning the larval habits of this insect agree with those of F. X. Williams. Adults emerge from May to September, with a peak of emergence during June for Half Moon Bay. Larvae were found to overwinter in the cylindrical burrows, where they move freely up and down the cylindrical passages. The hook-like processes evidently enable the larvae to move freely in the smooth burrows. Pupation occurred during June in the Half Moon Bay area, in the smooth burrows, without attachment of any kind; in fact, the pupae move freely in the larval burrows, being especially adapted for movement because of the specialized cephalic end and the spines of the abdominal segments. There is but a single generation a year as was indicated by Williams. No parasites were reared,



PLATE 5

Larval burrow of *Oidematophorus grandis*, in stem of *Baccharis pilularis*, enlarged approximately  $\times 1\frac{1}{4}$ .

although *Pimpla pterophorae* Ashm. has been reported reared from a pterophorid in stems of *Baccharis pilularis* at Los Angeles in May.<sup>4</sup>

*OIDAEMATOPHORUS PHOEBUS* Barnes and Lindsey.<sup>5</sup> Larvae of this species were collected on *Gnaphalium decurrens* var. *californicum* on January 13, 1938 at Carmel, California, one of the type localities.

Mature larva: Length 8 mm., greatest width 1.8 mm. Depressed, tapering posteriorly. Color, light green. Setae multiple, white, long. Setigerous tubercles white. A dorsal interrupted line of green, running longitudinally; a sub-dorsal, interrupted green line. Head somewhat retracted; color, light-brown with darker speckling. Body covered with secondary setae. Legs concolorous with underside of body.

Pupa: Length 8-9 mm.; width at mesothorax 1.76 mm. Angulate; widest at mesothorax and tapering posteriorly. Color a yellowish-white with dark brown to blackish markings; abdominal segments marked sub-dorsally with a black spot on each side and interrupted longitudinal dark-brown streaks; a black spot on each side of the mesothorax and a larger angulate black spot on each side below these; wing cases more yellowish and grooved with dark reddish-brown streaks; segments of antennae differentiated by darker color; legs and maxillae marked with reddish-brown; eyes partially marked with black; lateral longitudinal black lines on the abdominal segments extend from the wing cases to the end of the eighth segment. Front truncate. Prothorax produced upwardly, forming a longitudinal depression, ridged on each side, which extends posteriorly along the dorsal area of the abdominal segments. Spiracles slightly produced, black ringed. Cremasteric end produced with many hooked setae.

The larvae of this species feed on the parenchyma layer of the leaves leaving the epidermis. The pupal stage was 26 days under inside laboratory conditions.

These reared specimens seem to fit Barnes and Lindsey's description of *phoebus* perfectly. They are darker than examples from San Francisco, California.

*OIDAEMATOPHORUS MEYRICKI* Barnes and Lindsey.<sup>6-7</sup> Larvae of what has been taken as this species were collected on March 17, 1938, at Half Moon Bay, California, feeding on *Eriophyllum staechadifolium*. One larva pupated on April 5, with an adult emerging on April 27.

<sup>4</sup> Insect Life, vol. 3, p. 461, 1890.

<sup>5</sup> Pter. of Amer. North of Mexico, p. 106, 1921 (orig. desc.).

<sup>6</sup> Barnes and Lindsey, Pter. of Amer. North of Mexico, p. 397, 1921 (orig. desc.).

<sup>7</sup> The writer is indebted to T. Bainbrigg Fletcher for determination of this species. The specimens are larger than San Diego examples, but agree in other details.

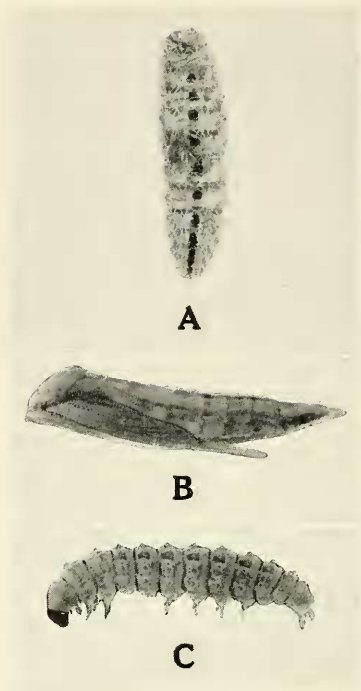


PLATE 6

- A. Mature larva of *Oidaematophorus phoebus*,  
enlarged approximately x 4.  
B. Pupa of *Platyptilia albiciliata*, enlarged x 5.  
C. Mature larva of *Trichoptilus californicus*,  
enlarged x 5.

PLATYPTILIA ALBICILIATA Walsingham.<sup>8</sup> On April 17, 1938, several larvae of this species were collected along with larvae of *Platyptilia acanthodactyla* Huebner on the Seaside Painted Cup, *Castilleja latifolia* var. *weightii* growing near the ocean at Sharp Park, San Mateo County, California.

Adult specimens here regarded as *albiciliata* are of a dull cinnamon-brown color with an indication of a dark spot before the cleft of the primaries. Scale tufts are lacking on the inner angle of the primaries distinguishing it from *carolina* Kearf., and the uncus is broadly spatulate as figured by Fernald.<sup>9</sup> As the host plant is reported as far north as Mendocino County and Walsingham's types are from along the coast in Mendocino County, it seems highly probable that this is Walsingham's species. Adults emerged during May and June.

<sup>8</sup> Walsingham, Pter. of Cal. and Ore., p. 17-18, 1880 (orig. desc.).

<sup>9</sup> Fernald, Pter. of North Amer., p. 80, fig. 8, 1898.

Mature larva: Length 12 mm.; width at segment 6, 1.9 mm. Body tapered gradually posteriorly. Color, pale green. Head green with darker blotches; black at ocelli ring; mandibles darker. Cervical shield green, armed with long setae which project forwards over the head. Setae, white, simple, from conical, brown-ringed tubercles. Entire body clothed with white-tipped secondary setae which emerge from a dark base and are dilated apically; also set with dark spinules which show up only under magnification. Stigmata, brown-ringed. Legs concolorous with body. Pro-legs stalk-like. Crochets hook-like, 8-9, arranged in a uniordinal semi-circle.

Pupa: Length 11 mm., greatest width at mesothorax 2 mm. Angulate. Color a dark reddish-brown. Mesothorax produced dorsally and posteriorly to a point from which project two ridges anteriorly and posteriorly extending as separate ridges to abdominal segment 3. Slightly narrowed at first abdominal segment, then enlarged posteriorly. Wing cases show the presence of veins. The appendages are produced to the end of the fifth abdominal segment. Cremasteric end produced, furrowed medially as seen from a dorsal view; divided into two areas of attachment each of which are set with numerous hooked setae.

The pupa is naked, attached by the cremasteric end to the leaves or stems of the plant. When disturbed it makes a spasmodic movement bending at the fifth and sixth abdominal segments, throwing the anterior part of the body backwards. It differs from the pupa of *P. acanthodactyla* Huebner in lacking the dorsal blade-like processes and in the dark reddish-brown color.

TRICHOPTILUS CALIFORNICUS Walsingham.<sup>10-11</sup> Larvae of this species were collected on *Isocoma veneta* var. in the Panoche Hills region, Fresno County, California on April 9, 1938. On April 24, a larva was collected on *Grindelia* at Antioch, Contra Costa County, California which proved to be the same species.

Mature larva: Length 7 mm. Color gray-green. Body tapered slightly anteriorly and posteriorly from the middle. Head black. Cervical shield, green, set with anteriorly projecting setae. Setae arising from well developed tubercles; one or two from a tubercle; setae are thickened and knobbed apically. Intersegmental areas and ventral areas covered with small, black spinules. Occasional short, white, secondary setae are also found which are knobbed apically. Anal plate armed with long setae. True legs black; prolegs slender, stalk-like; crochets 6-7 in number, hooked and arranged in a uniordinal semi-circle.

Pupa: Length 7 mm.; greatest width 1.8 mm. Color light green. Angulate and covered with long, whitish setae. A com-

<sup>10</sup> Walsingham, Pter. of Cal.-Ore., p. 60-62, 1880 (orig. desc.).

<sup>11</sup> T. Bainbrigge Fletcher kindly confirmed my determination of this species.

pond setigerous tubercle bearing two setae are found on the abdominal segments, located sub-dorsally; that of the third abdominal segment, with a black base. Small nodule-like projections are scattered over the surface. The large hairs of the abdomen are slightly swollen apically. Mesothorax produced upwardly. Prothorax produced forward on each side and with an outwardly projecting ridge at the base of the antennae. Eyes and maxillae darker than the rest of the appendages. Wing cases hairy, with hairs lacking swollen tips. Appendages reach to end of sixth abdominal segment. Cremaster divided into two areas, one group of hairs terminally and another on the venter of segment 7. Abdominal segments 4, 5, 6 are movable, and 7-8 fused.

On *Isocoma* a larva pupated on April 22, with an adult emerging May 15. A larva from *Grindelia* pupated May 10 with the adult emerging May 23.



## A NEW PLUME MOTH FROM ARIZONA

(LEPIDOPTERA—PTEROPHORIDAE)

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Through the courtesy of Dr. John A. Comstock I have had the opportunity of studying a *Platyptilia* species which apparently can most conveniently be placed close to *percnodactyla* (Walsingham) and *carduidactyla* (Riley), although in coloration it appears to be more like *williamsii* Grinnell.

*Platyptilia percnodactyla* (Walsingham) was described in 1880<sup>1</sup> from specimens collected in Shasta County, California. There has been some doubt as to its distinctness from *P. carduidactyla* (Riley), but a long series of *carduidactyla* reared from thistles by the author fails to show any reduction in the scale tuft of the third feather of the hind wings as found in *percnodactyla*. Until the life history of *percnodactyla* is known it is perhaps better to retain both as distinct species.

<sup>1</sup> Pterophoridae of California and Oregon, p. 18, 1880.